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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,359	02/20/2004	Shian-Jyh Lin	10113811	2413
34283	7590	07/21/2005	EXAMINER	
QUINTERO LAW OFFICE 1617 BROADWAY, 3RD FLOOR SANTA MONICA, CA 90404			LE, THAO P	
			ART UNIT	PAPER NUMBER
			2818	
DATE MAILED: 07/21/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/783,359	<b>Applicant(s)</b> LIN ET AL.	
	<b>Examiner</b> Thao P. Le	<b>Art Unit</b> 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/20/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### Priority

Acknowledge is made of applicants' claim for foreign priority base on an application 92104769 filed in Taiwan on 03/06/2003.

It is noted that Applicants have filled a certified copy of said application as required by U.S.C 119, which papers have been placed of record in the file.

### ***Information Disclosure Statement***

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on **2/20/04** and made of record.

The references cited on the PTOL 1449 form have been considered.

Claims 1-16 are pending in this application.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-16 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11-22 of copending Application No. 10/620518 or U.S. Pub No. 20040082200. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 11-22 of copending Application No. 10/620518 contains all limitations cited in dependent claims 1, and 11.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application

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filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1, 2-6, 9-12, 15-16 are rejected under 35 USC 102 (e) as being anticipated by Chen et al., U.S. Pub No. 2003/0148580.**

Regarding claim 1, Chen et al. discloses a method of forming a bottle-shaped trench comprising: (See Figs. 1-10 and pages 1-2):

Providing a substrate 100,

Forming a trench 107 in the substrate, wherein the trench has a trench surface with an upper portion II and lower portion I beneath the upper portion;

Forming a dielectric layer 110a on the trench surface at the lower portion (Fig. 4);

Using the dielectric layer as a mask, performing a nitridation procedure to form a nitride film 114 (paragraph 0022) on the trench surface at the upper portion;

Removing the dielectric layer (Fig. 7);

Using the nitride film as a mask, performing an isotropic etching procedure to form a space B in the trench at the lower portion.

Regarding claim 11, Chen et al. discloses a method of forming a bottle-shaped trench comprising: (See Figs. 1-10 and pages 1-2):

Providing a Si substrate 100, the Si substrate contains single crystal silicon;

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Forming a trench 107 in the substrate, wherein the trench has a trench surface with an upper portion II and lower portion I beneath the upper portion;

Forming a conformal dielectric layer 110a on the trench surface at the lower portion (Fig. 4);

Filling a photoresist layer 112 in the trench and partially etching back the photoresist layer to form a remaining photoresist layer on the dielectric layer at the lower portion (paragraph 0020);

Using the remaining photoresist layer as a mask, removing the dielectric layer at the upper portion to leave a remaining dielectric layer on the trench surface at the lower portion (Fig. 4);

Removing the remaining photoresist layer (Fig. 5);

Using the dielectric layer as a mask, performing a nitridation procedure (RTN) to form a nitride  $\text{Si}_3\text{N}_4$  film 114 (paragraph 0022) on the trench surface at the upper portion;

Removing the dielectric layer (Fig. 7);

Using the nitride film as a mask, performing a wet etching procedure to form a space B in the trench at the lower portion.

Regarding claim 2, Chen et al. discloses the substrate is single crystal silicon (paragraph 0018).

Regarding claim 3, Chen et al. discloses the dielectric layer is oxide layer formed by CVD.

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Regarding claims 4, 12, Chen et al. discloses the thickness of the dielectric layer which falls into the ranged of 10-200 Å and formed by CVD (50-200A; paragraph 0019).

Regarding claim 5, Chen et al. discloses claim 1 and further comprising the steps of :

Forming a conformal dielectric layer 110a on the trench surface at the lower portion (Fig. 4);

Filling a photoresist layer 112 in the trench and partially etching back the photoresist layer to form a remaining photoresist layer on the dielectric layer at the lower portion (paragraph 0020);

Using the remaining photoresist layer as a mask, removing the dielectric layer at the upper portion to leave a remaining dielectric layer on the trench surface at the lower portion (Fig. 4);

Removing the remaining photoresist layer (Fig. 5);

Using the dielectric layer as a mask, performing a nitridation procedure (RTN) to form a nitride  $\text{Si}_3\text{N}_4$  film 114 (paragraph 0022) on the trench surface at the upper portion;

Removing the dielectric layer (Fig. 7);

Using the nitride film as a mask, performing a wet etching procedure to form a space B in the trench at the lower portion.

Regarding claim 6, Chen et al. discloses the nitridation procedure is a RTN.

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Regarding claims 9-10, 15-16, Chen et al. discloses the claim 1 and further comprising the steps of forming a pad layer on part of the substrate and using the pad layer as a mask, removing part of the substrate to form the trench therein and the pad comprises a pad oxide layer and a nitride layer (paragraph 0018).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-8, 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Pub. No. 2003/0148580.

Regarding claims 7, 13, Chen et al. discloses the temperature used in RTN process is in the ranged cited in present claims (paragraph 00220).



Regarding claims 8, 14, Chen et al. discloses the thickness of the nitride layer is about 50-200 Å but fails to disclose the thickness of the nitride layer is about 15-30 Å. However, the selection of these parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc., or in combination of the parameters** would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao P. Le whose telephone number is 571-272-1785. The examiner can normally be reached on M-T (7-6).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A handwritten signature in black ink, appearing to read 'Thao P. Le', with a stylized, flowing script.

Thao P. Le

Examiner

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